Analysis of TestBeam2012

introduction to the software

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TPC Analysis Meeting, Feb. 11-12 @ KEK

common setup (PC-->KEKCC)

where is the data

   /hsm/ilc/user/cdc/data/bmtest/2012Dec/lcio (converted raw data, Thanks to Ryo)

where is ilcsoft

   /group/ilc/soft/ilcsoft/x86_64_gcc44/v-01-16-02 (the common version used by simulation study)

where is MarlinTPC

   instead of the standard one within ilcsoft, we need some version which we can modify
   /home/ilc/tianjp/soft/MarlinTPC/v00-11

sample of analysis code

   /home/ilc/tianjp/analysis/TestBeam2012/LP_Asian

main processors and elements of analysis

- *PulseFinderProcessor*

  read the raw data information of each electronic channel and find the pulse

- *ChannelMappingProcessor*

  map the pulse of each channel to the pad

- *RowBasedHitFinderProcessor*

  reconstruct the hit based on the pulses of each pad in a same row, using the center-of-gravity method

- *TrackMakingKalmanFilterProcessor*

  tracking based on all the hits

- *RootFileProcessor*

  Ryo's private processor, to read out various information of pulse, hit and track

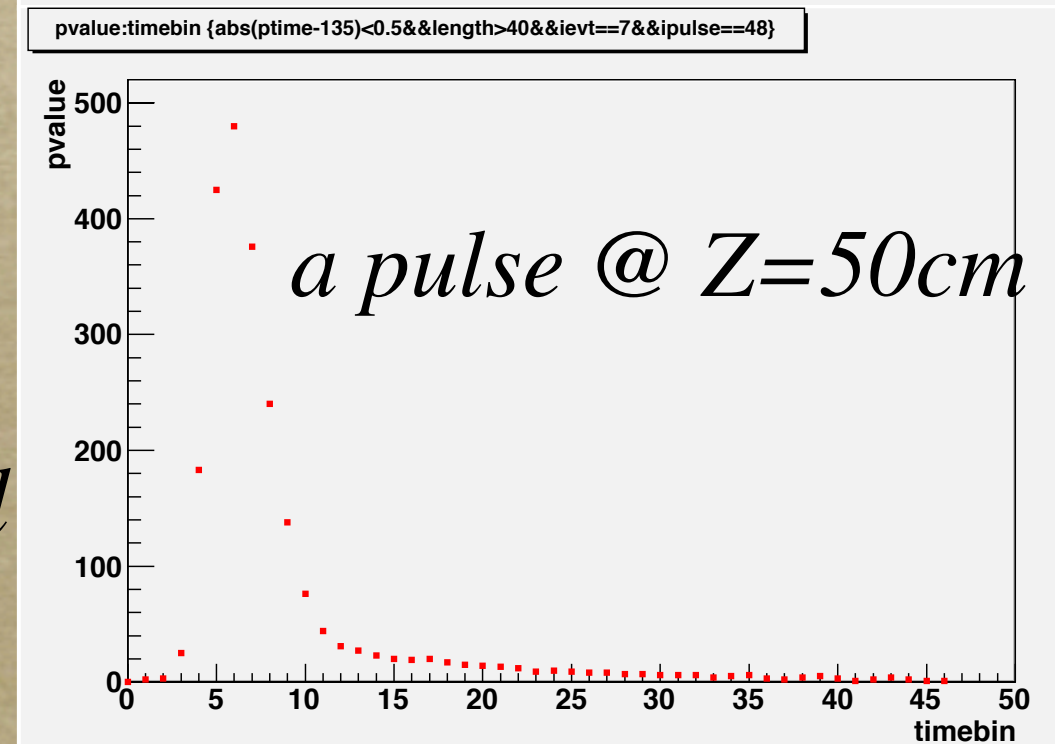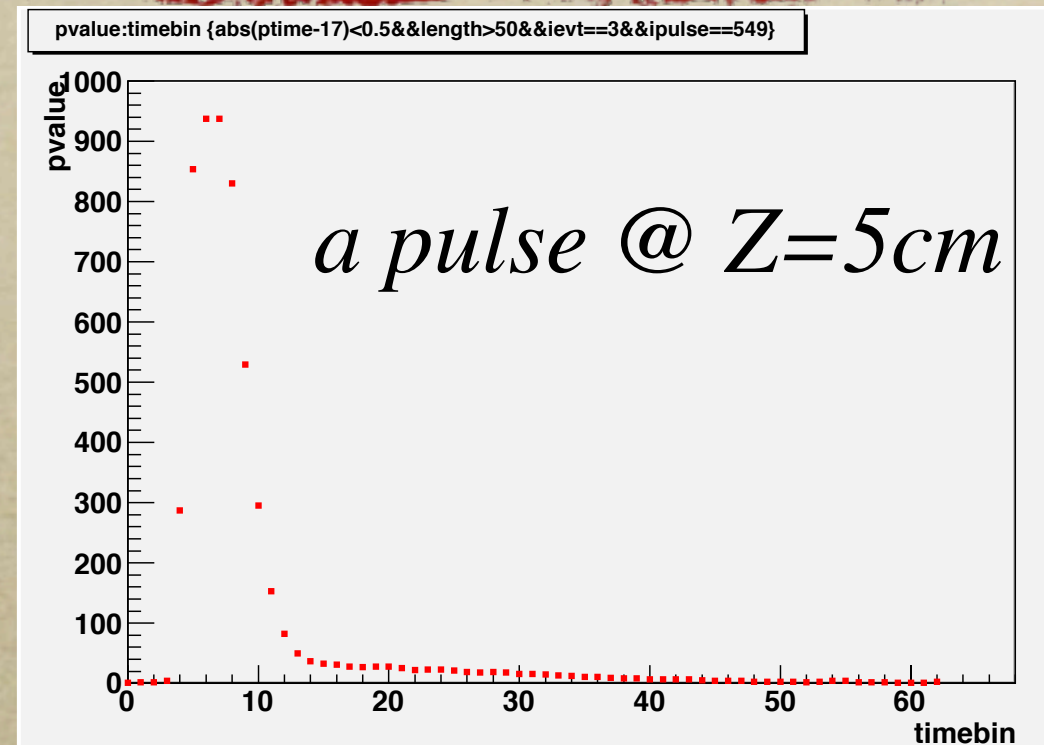*we need to understand the reconstruction of these elements are correct and optimized*

reconstruction of pulse
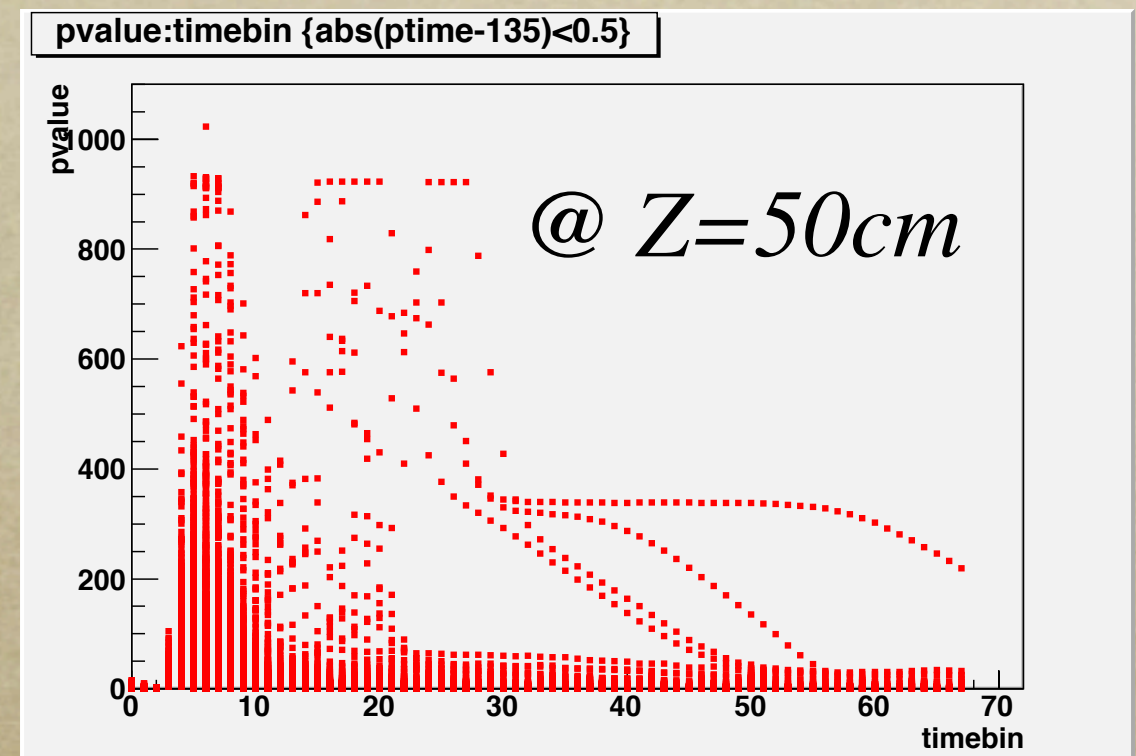
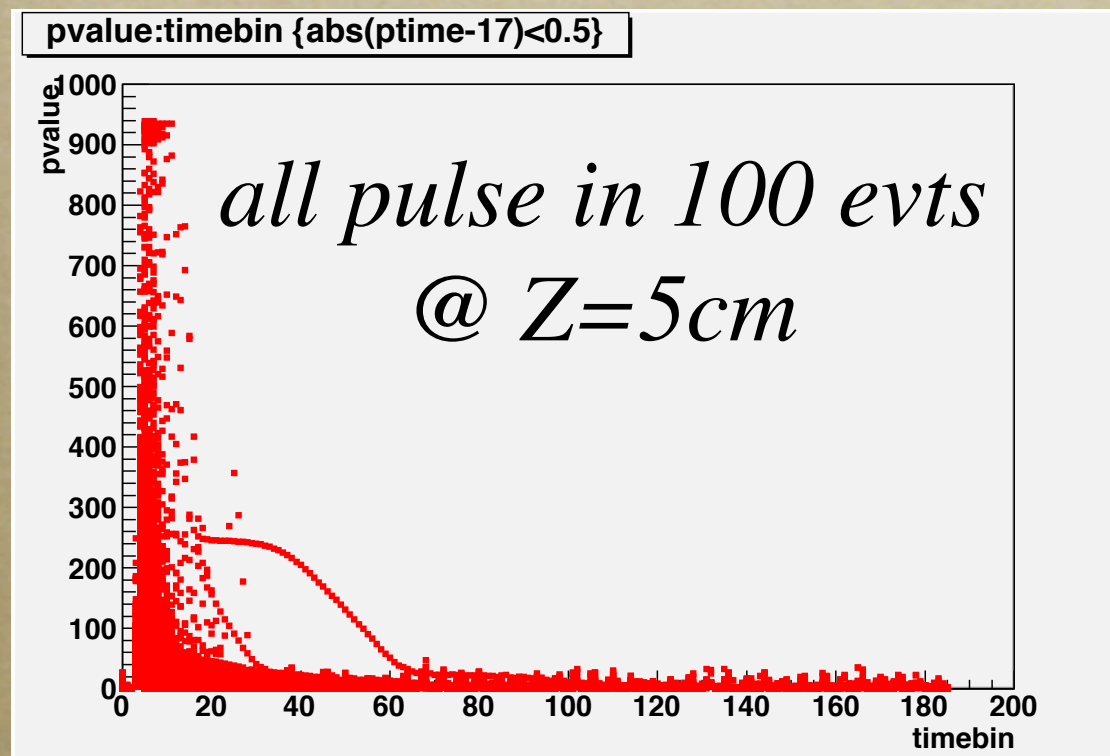*parameters need to be set and optimized*

- ✦ *start threshold (6)*
- ✦ *end threshold (6)*
- ✦ *minimum height (8)*
- ✦ *minimum length (3)*
- ✦ *N Bins before start (1)*
- ✦ *N Bins after end (3)*
- ✦ *Pedestal override (0.5)*

Pulse Charge = sum of ADC values in all the bins within the pulse (w/ threshold)

pvalue:timebin {abs(ptime-17)<0.5&&length>50&&ievt==3&&ipulse==549}

a pulse @ Z=5cm

pvalue:timebin {abs(ptime-135)<0.5&&length>40&&ievt==7&&ipulse==48}

a pulse @ Z=50cm

reconstruction of pulse -- difficulties with noises

all pulse in 100 evts @ Z=5cm

@ Z=50cm

due to the limit of maximum pulse length (200, set by electronics), more noise pulses come in for the shorter drift length case

--- we need study carefully how to set the threshold which would efficiently remove the contribution of noise in the charge calculation

reconstruction of hit

parameters need to be set and optimized

- ✦ *maximum time between pulses in a hit (200 ns)*
- ✦ *minimum of the height of maximum pulse in a hit (12)*
- ✦ *minimum number of pads (1)*
- ✦ *max number of consecutive empty pads (1)*

Hit Charge = sum of pulses charges

things to do

- *check pulse after pulse finder (charge)*

- *check efficiency of hit reconstruction (dependence with pulse)*

- *study the handle of noise*

- *optimize all the parameters*

a sample processor of pulse check has been prepared:

/home/ilc/tianjp/analysis/TestBeam2012/PulseCheck

take advantage of many CPUs at KEKCC and easy to share processors (running all the data sets can be completed in at most 1 hour)